16 DEPARTMENT OF PUBLIC SAFETY

219 OFFICE OF STATE FIRE MARSHAL

Chapter 4: WATER-BASED FIRE PROTECTION ~~SPRINKLER~~ SYSTEMS

SUMMARY: This rule establishes the design, installation, operation, maintenance, inspection, testing and all other aspects of water-based fire protection~~sprinkler~~ systems ~~protection~~ for occupancies and structures with water-based fire protection ~~sprinkler~~ system ~~fire protection~~ measures. ~~and incorporates by reference National Fire Protection Association (NFPA) standards.~~

SECTION 1. This rule incorporates by reference the NFPA standards indicated. All rights reserved by the NFPA. Copies of these standards are available through the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269.

NFPA #13	*Standard for the Installation of Sprinkler Systems*, 2007 edition
NFPA #13D	*Standard for the Installation of Sprinkler Systems in One and Two Family Dwellings and Manufactured Homes*, 2007 edition
NFPA #13R	*Standard for the Installation of Sprinkler Systems in Residential Occupancies Up To and Including Four Stories in Height*, 2007 edition
NFPA #14	*Standard for the Installation of Standpipe, Private Hydrants and Hose Systems*, 2007 edition
NFPA #15	*Standard for Water Spray Fixed Systems for Fire Protection*, 2007 edition
NFPA #16	*Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems*, 2007 edition
NFPA #20	*Standard for the Installation of Stationary Fire Pumps for Fire Protection*, 2007 edition
NFPA #22	*Standard for Water Tanks for Private Fire Protection*, 2008~~3~~ edition
NFPA #24	*Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, 2007 edition
NFPA #25	*Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems*, 2008~~2~~ edition
NFPA #214	*Standard on Water Cooling Towers*, 2005 edition
NFPA #318	*Standard for the Protection of Semiconductor Fabrication Facilities*, 2006 edition
NFPA #409	*Standard on Aircraft Hangers*, 2004 edition
NFPA #418	*Standard for Heliports*, 2006 edition
NFPA #750	*Standard on Water Mist Fire Protection Systems*, 2006 edition

SECTION 2. The text of this subsection (2) is comprised of the text of former Chapter 4, State of Maine Standard for the Design and Installation of Life Safety Sprinkler Systems, attached. Copies of this subsection are available through the Office of State Fire Marshal, 52 State House Station, Augusta, ME 04333.

SECTION 3. This rule incorporates by reference the State of Maine Standard for the Hydro-Pro Wet or Dry Sprinkler Systems, 1993 edition. A copy of this standard follows this chapter. Copies of this standard are available through the Office of State Fire Marshal, 52 State House Station, Augusta, ME 04333.

SECTION 4. Fees and Requirements for Sprinkler Certification, Licensing, ~~Renewals,~~ Registration and Renewals~~Requirements~~

1. The fee for the certification of a "Responsible Managing Supervisor"(RMS) is $ 300.00. ~~is valid for up to two years.~~ All initial ~~the~~ RMS certifications~~licenses~~ and renewals will expire on the second June 30th (at midnight) from the time of the issuing of the license, with the following excpeption: initial licenses issued between April 1st and midnight June 29thh inclusive shall expire on the third June 30th from the date of issue. ~~The renewal of the license is valid for two years.~~ When more than 3 RMS are employed by a company, the fee is $ 225.00 per RMS for that company.

2. The fee for the license required by a "Fire Sprinkler System Contractor" is $ 300.00. ~~and is valid for up to two years.~~ The Fire Sprinkler System Contractors initial and renewal license(s) will expire on the second June 30th (at midnight) from the time of the issuing of the license. ~~.~~ with the following exception: initial licenses issued between April 1st and midnight June 29thh inclusive shall expire on the third June 30th from the date of issue. ~~Each renewal of license is valid for two years.~~

3. The fee for the registration ~~license~~ of a Fire Sprinkler Inspection Technician is $ 100.00. ~~and is valid for up to two years including initial testing.~~ When a company employs more than 3 inspectors, the fee is $ 75.00 per inspector for that company. ~~For company discounts to apply, the fee must be paid by the company, or there must be a written statement that the company reimburses the employee.~~ The Fire Sprinkler Inspector's initial and renewal license(s) will expire on the second June 30th (at midnight) from the time of the issuing of the license with the following exception: initial licenses issued between April 1st and midnight June 29thh inclusive shall expire on the third June 30th from the date of issue. ~~Each renewal of the license is valid for two years.~~

4. In order to be registered as an ~~Requirement for the~~ Inspection Technician, the applicant must provide ~~license is~~ proof of qualification, such as a National Institute for Certification in Engineering Technologies (N.I.C.E.T.) Level II certification or the successful completion of a ~~other~~ nationally recognized training course ~~standard achieved~~ in the area of fire sprinkler inspection. ~~, such as passing of an inspector's training course by AFSA or NFSA~~

5. Renewals: All licenses, certificates and registrations shall be renewed on or before midnight, June 30th ~~July 1~~, of the appropriate year of expiration. A $100.00 ~~late~~ reinstatement fee will apply to renewing a license that has already expired.

6. In plant industry maintenance, personnel shall not need to be registered as *Inspection Technicians.*

7. Inspections of public building fire sprinkler systems are to be conducted by a licensed inspector annually. Inspection reports of non-compliance, where the owner is not scheduling correction, are to be submitted to the Office of State Fire Marshal~~State Fire Marshal's Office~~ in accordance with National Fire Protection Association (NFPA) Standard #25. All inspection ~~R~~reports are to include the Inspection Technician registration ~~license~~ number. All other inspection reports are to be made available to the Office of the State Fire Marshal~~'s Office~~ upon request.

8. *Certified Responsible Managing Supervisors* are not required to register as *Inspection Technicians* but must apply if they want an inspection Technician license number.

9. A Responsible Managing Supervisor does not have to pay for a Contractor's license if the Contractor's license name is the same as the name of the Responsible Managing Supervisor, (as opposed to a company or business name).

SECTION 5. Design Requirements

1. A cushion of 5 p.s.i. is required on fire sprinkler hydraulic calculations. Some or all of this cushion may be waived by the State Fire Marshal's Office in unusual circumstances, such as in determining whether or not a fire pump will be required. The 5 p.s.i. cushion is not required on National Fire Protection Association Standard (NFPA) Standard # 13D fire sprinkler systems.

2. Hydrant flow tests for fire sprinkler system design shall be not greater than five years old. The authority having jurisdiction may require a current test when deemed necessary. Until current water data is available, an extra 1 p.s.i. of cushion is required for every year that the test data is greater than 5 years old. *[For example, water data that is 9 years old will require a 9 p.s.i. safety margin.]* This does not apply to NFPA Standard #13D fire sprinkler systems. Exceptions may be granted by the State Fire Marshal's Office.

3. A maximum 65 p.s.i. automatic will be required on all wet standpipes in accordance with NFPA Standard ~~-~~#14.

4. Standpipes not required by NFPA Standard #101 may be manual dry or manual wet subject to approval by the local fire department.

5. Fire sprinkler systems required by any internationally or nationally recognized building code, or required by any local ordinance or required by any insurance company~~Building Officials and Code Administrators International, Inc. (BOCA) or local ordinance required systems will have to~~ must be approved by the Office of State Fire Marshal and shall ~~will~~ meet National Fire Protection Association Standards #13, #13R, #13D, Maine Life Safety System or Hydro-Pro System criteria.

6. Prior to construction of any new fire sprinkler system over 6 heads, or any addition to an existing fire sprinkler system of more than 20 heads, a fire sprinkler permit shall be required in accordance with 32 M.R.S.A. §1371-1382. *[Relocated heads shall count toward the 20 heads, but the replacement of existing heads without a change in piple length shall not.]*

7. Non-combustible/limited-combustible spaces having 15 or more combustible electrical cables ~~wires~~ grouped together such as in cable trays, shall be fully sprinklered in the area of the cables in NFPA Standard #13 fire sprinkler systems ~~wires~~. Plenum-rated and riser-rated telecommunication cables however ~~wire~~ are considered to be limited combustible/fire resistive according to standards established by NFPA Standard #70 and therefore do not trigger this fire sprinkler requirement.

8. All industrial hose stations shall be required to be reduced to 100 psi.

9. Fire pumps and standpipes shall be considered part of the sprinkler system and subject to review and permitting.

10. All dry pipe systems shall have a low-air alarm in addition to a low-air switch for the compressor.

11. Operating freezers shall not require fire sprinkler protection if they are not used or intended to be used with fork lifts and the storage does not exceed 8' in height, and the door(s) are all self-closing, positive-latching and the rooms do not exceed 800 square feet.

12. Exterior canopies shall not require fire sprinkler coverage if they are less than 4' wide and are constructed of non-combustible/ limited-combustible material, regardless of the use beneath them.

13. With prior approval of the Office of State Fire Marshal, ~~C~~canopies that meet an exception in the currently-adopted edition of NFPA Standard #13 for not requiring fire sprinkler protection beneath them ~~shall~~ may not require fire sprinkler protection within them, even if the interior construction contains combustible material. ~~by the State Fire Marshal's Office.~~

14. Fire sprinkler heads in elevator shafts shall have a shut-off outside of the shaft, arranged in such a way so that servicing of the head in the machine room will have a minimum amount of water to drain into the room.

15. Fire sprinkler heads in elevator machine rooms shall have a shut-off outside of the machine room, arranged in such a way so that servicing of the head in the machine ~~-~~room will have a minimum amount of water to drain into the room.

16. The shut-off for the elevator shaft head and the elevator machine room head(s) can be the same ~~-~~control valve, but if there is a head at the top of the shaft and one in the elevator pit, then ~~-~~they shall have separate shut-offs.

17. Fire sprinkler heads shall not be installed before sheetrock is installed on the walls and/ or ceilings that they penetrate.

18. Hose connections on stages are to be on the audience side of the proscenium curtain. Exceptions may be granted by the Office of State Fire Marshal.

19. The type of and location of the fire department connection and of the standpipe connection are subject to the local fire department.

20. Vital records storage vaults less than 5000 square feet in area and for no more than brief occupancy may have smoke detection/heat detection within, plus a fire extinguisher in near proximity, in place of fire sprinkler coverage within. For this exception to apply, the room must be either 2-hour fire rated or be of non-combustible construction, or the exposed interior surface must be of non-combustible construction;~~source for this general requirement.)~~ and the smoke/heat detection must be alarmed to a constantly-attended location, and the door to the vault must be closed and locked whenever there is no occupancy.

21. Fire sprinkler heads shall not be installed before sheetrock is installed. Special exceptions may be granted by the State Fire Marshal's Office.

22. Maine Life Safety shall not require fire sprinkler coverage of bathrooms that are less than 55 square feet in area.

23. Hydro-Pro standard shall not require fire sprinkler coverage of freezers or of elevator shafts or any exceptions mentioned in NFPA 13R, but not specifically mentioned ~~–~~in the Hydro-Pro standard.

24. Bladder tanks shall not be required for Hydro-Pro systems.

25. For sprinkler heads shall be used within their listings in both the Maine Life Safety and Hydro-Pro standards. Special exceptions may be granted by the State Fire Marshal's Office.

26. Low-water alarms or automatic fills are required for stored water sources in all life-safety fire sprinkler ~~both the Maine Life Safety and Hydro-Pro~~ standards other than NFPA Standard #13D.

27. Pump power monitoring is required in all life-safety fire sprinkler systems other than NFPA Standard #13D systems~~both the Maine Life Safety and Hydro-Pro~~ standards.

28. Fire pumps used in the Maine Life Safety standard and the Hydro-Pro standards are not required to be listed for fire service. Fire pumps that are less than 7.5 horsepower are not required to be listed for fire service in NFPA Standard #13R systems.

29. The required water volumes for ~~the Maine Life Safety and Hydro-Pro~~fire sprinkler systems ~~standards~~ may be ~~-~~altered depending upon the occupancy type, occupant load, construction type, building height and other related factors. Prior approval must be granted by the State Fire Marshal's Office.

STATUTORY AUTHORITY**:** 25 M.R.S.A. §§ 2452; 32 M.R.S.A. §§ 1373, 1374, 1382

Chapter 4 History:

EFFECTIVE DATE:

September 1, 1988 - filing 88-281 as "State of Maine Standard for the Design and Installation of Life-Safety Sprinkler Systems"

EFFECTIVE DATE (ELECTRONIC CONVERSION):
May 15, 1996

REPEALED AND REPLACED:
August 7, 2001 - filing 2001-290 as "Sprinkler Systems." Incorporates subject matter from former Chapters 4, 8, 9, 10, 12, 13, 14, 241, 243, 245, and 248.

AMENDED:
August 17, 2002 - filing 2002-311, Section 1 (NFPA #15 and NFPA #409 updated)
June 1, 2003 - filing 2003-166
August, 18, 2004 - filing 2004-340, updates NFPA #20 to 2003 edition
April 23, 2006 – filing 2006-152, updates title of NFPA #318, updates NFPA #409 to 2004 edition, updates NFPA #418 to 2001 edition

16 DEPARTMENT OF PUBLIC SAFETY

219 OFFICE OF STATE FIRE MARSHAL

STATE OF MAINE STANDARD FOR THE DESIGN AND INSTALLATION OF LIFE-SAFETY SPRINKLER SYSTEMS

DESIGN AND INSTALLATION OF LIFE-SAFETY SPRINKLER SYSTEMS

CONTENTS

PREFACE

The intent of this design guide is to de fine an alternative sprinkler system installation which offers an enhanced level of life-safety to occupants evacuating a structure during the first minutes of a detected fire. The system design is not primarily intended to adequately protect the structure itself from fire loss or damage. A complete sprinkler system designed and installed in accordance with NFPA #13 may offer superior protection to the structure and contents.

GUIDE FOR THE DESIGN AND INSTALLATION OF LIFE-SAFETY SPRINKLER SYSTEMS

NOTICE: An asterisk following the number or letter designating a subdivision indicates explanatory material on that subdivision (if so included). Information on referenced publications can be found in Section 7.

SECTION 1 GENERAL INFORMATION

1-1 Application

1-1.1 The sprinkler system herein described is an alternative design subject to permission for its use by the office of State Fire Marshal exclusively. The system will ordinarily be permitted in buildings up to four stories in height, which will fall into the following categories: apartment buildings, condominiums, hotels, motels, inns, low-rise office buildings, small boarding homes, existing or new class "C" places of assembly, class "C" mercantile and other similar occupancies. The lack of a water supply of sufficient capacity to support the normally installed NFPA #13 sprinkler system may be the determining factor in obtaining permission to use this alternative design. Approval may also be required in those municipalities who have adopted sprinkler system requirements.

1-1.2 It is advisable to obtain permission for the use of the sprinkler system described herein directly from the State Fire Marshal's Office prior to preparation of plans and hydraulic calculations.

1-2 Scope

This standard deals with the alternative design and installation of automatic sprinkler systems as permitted by the State Fire Marshal,

1-3 Levels of Protection

1-3.1 Various levels of fire safety are available to dwelling occupants to provide life safety and property protection.

This standard recommends, but does not require, sprinklering of all areas in a dwelling; it permits sprinklers to be omitted in certain areas. These areas are the ones shown by NFPA statistics (see following table A-1-3) to be the ones where the incidence of life loss from fires in dwellings is low. Such an approach produces a reasonable degree of fire safety. Greater protection to both life and property may be achieved by sprinklering all areas.

1-3.2 This standard assumes that one or more smoke detectors will be installed in accordance with the appropriate standard for the installation, maintenance and use of fire warning equipment.

Table A-1-3

Casual Factors in One- and Two-Family Dwelling Fires Which Caused One or More Deaths

	Area of Origin	
Living Room	41%	
Bedroom	27%	
Kitchen	15%	Based on 6066 incidents
Storage Area	4%	where area of origin was
Heating Equipment Room	3%	reported
Structural Area	2%	
Other Areas	8%	
Form of Material		
Furniture	27%	
Bedding	18%	
Combustible Liquid or Gas	13%	
Interior Finish	9%	
Structural Member	9%	Based on 5080 incidents
Waste, Rubbish	4%	where form of material
Clothing, on a Person	3%	ignited was reported
Cooking Materials	3%	
Electrical Insulation	2%	
Curtains, Drapery	2%	
Other	10%	
Form of Heat Ignition		
Smoking Materials	36%	
Heat from Fuel - Fire or Powered Object	25%	
Heat from Miscellaneous Open Flame (Including Match)	15%	Based on 5016 incidents where form of heat
Heat from Electrical Equipment Arcing or Overload	14%	ignition was reported
Hot Objects Including Properly Operating Electrical Equipment	7%	
Other	3%	
Total number of incidents reported	10,194	

Source: FIDO Data Base 1973 to 1982. NFPA Fire Analysis Dept.

1-4 Purpose

1-4.1 The purpose of this standard is to provide a sprinkler system that will aid in the detection and control of fires in occupancies where the quantity and/or combustibility of contents is low and fires with relatively low rates of heat release are expected, An operating sprinkler system installed in accordance with this standard is expected to prevent flashover (total involvement) in the room of fire origin, and increase the chances for occupants to escape or to be evacuated,

1-5 Definitions

Approved. Acceptable to the "authority having jurisdiction."

Authority Having Jurisdiction. The State Fire Marshal shall be the authority having jurisdiction.

Backflow Prevention Device. A device that does not allow liquid to flow back to the supply and thus cause contamination.

Check Valve. A valve that allows flow in one direction only.

Control Valve. A valve employed to control (shut off or turn on) a supply of water to a sprinkler system.

NOTE: System control valves should be of the indicating type, such as plug valves, ball valves, butterfly valves, or OS and Y valves.

Density. The quantity of water discharged by automatic sprinklers over a specific area expressed as gallons per minute per square foot (GPM/FT^2).

Design Area. An area expressed in sq. ft. having a number of sprinklers, all flowing at or above the minimum required application rate.

Fire Department Connection. A threaded inlet connection located on the exterior of a building, arranged to enable the Fire Department to pressurize and supply the sprinkler system, bypassing the system control valves and supply main.

Labeled. Equipment or materials which has attached a label, symbol or other identifying mark of an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

Listed. Equipment or materials included in a list published by an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or material and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

NOTE: The means used for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The "authority having jurisdiction" should utilize the system employed by the listing organization to identify a listed product.

Pre-engineered System. A packaged sprinkler system including all components, designed to be installed according to pretested limitations.

Pump. A mechanical device that transfers and/or raises the pressure of a fluid (water).

Residential Sprinkler Head. An automatic sprinkler specifically listed for use in residential occupancies.

Shall. Indicates a mandatory requirement.

Should. Indicates a recommendation or that which is advised but not required.

Sprinkler-Automatic. A fire suppression device which operates automatically, when its heat actuated element is heated to or above its thermal rating, allowing water to discharge over a specific area.

Sprinkler System. An integrated system of piping connected to a water supply, with listed sprinklers which automatically initiate water discharge over a fire area. This Design Guide requires sprinkler systems to include a control valve and a device for actuating an alarm upon system operation.

Standard. A document containing only mandatory provisions using the word "shall" to include requirements. Explanatory material may be included only in the form of "fine print", italic notes, footnotes, or in appendix.

Supply Pressure. Pressure within the water supply system (i.e., city or private water source),

System Pressure. Pressure within the sprinkler system (i.e., above the check valve or other backflow prevention device).

Water Flow Alarm. An electrical sounding device activated by a water flow detector arranged to sound an alarm audible in all living areas over background noise levels with all intervening doors closed.

Wet System. A system employing automatic sprinklers attached to a piping system filled with water and connected to a water supply so that water discharges immediately from sprinklers opened by fire.

SECTION 2 INSTALLATION

2-1 Devices and Materials

2-1.1 Only listed new residential sprinklers shall be employed in the installation of life-safety sprinkler systems. Standard sprinklers or fast-response sprinklers of intermediate or high temperature rating may be installed in areas of high ambient temperature. Sprinklers shall be listed.

2-1.2 Only listed and approved materials and devices shall be used in sprinkler systems.

Exception: Listing may be waived for tanks, hangers, water flow detection devices and water control valves. All electrical components must be U.L. listed.

2-1.3 Pre-engineered systems shall be installed within the limitations which have been established by the testing laboratories where listed.

2-2 Acceptance Tests

2-2.1 The installer shall perform all required acceptance tests,, complete the Contractor's Material and Test Certificate(s), and forward the certificates to the "authority having jurisdiction", prior to asking for approval of the installation.

2-2.l.l When the "authority having jurisdiction" desires to be present during the conducting of acceptance tests, the installer shall give advance notification of the- time and date the testing will be performed.

2-2.2 Underground mains and lead-in connections to system risers shall be flushed before connection is made to sprinkler piping, in order to remove foreign materials that may have entered the underground piping during the course of the installation. For all systems, the flushing operation shall be continued until water is clear.

2-2.2.1 Underground mains and lead-in connections shall be flushed at the hydraulically calculated water demand rate of the system,

2-2.2.2 To avoid property damage, provision shall be made for the disposal of water issuing from test outlets.

2-2.3 All aboveground piping shall be hydrostatically tested at 200 p.s.i. for two hours, in accordance with N.F.P.A. #13, Standard for the Installation of Sprinkler Systems.

2-2.4 It is suggested, but not required, that all underground supply piping from the water utility shut-off to the sprinkler system connection be hydrostatically tested at 50 p.s.i. above the expected static pressure for two hours, to ensure the reliability of the materials and installation.

CONTRACTOR'S MATERIAL AND TEST CERTIFICATE FOR ABOVE GROUND PIPING - GENERAL INFORMATION

DELUGE & PREACTION VALVES

OPERATION [ ] PNEUMATIC [ ] ELECTRIC [ ] HYDRAULIC				
PIPING SUPERVISED [ ] YES [ ] NO		DETECTING MEDIA SUPERVISED [ ] YES [ ] NO		
DOES VALVE OPERATE FROM THE MANUAL TRIP AND/OR REMOTE CONTROL STATIONS? [ ] YES [ ] NO				
IS THERE AN ACCESSIBLE FACILITY IN EACH CIRCUIT FOR TESTING? [ ] YES [ ] NO		IF NO, EXPLAIN		
MAKE	MODEL	DOES EACH CIRCUIT OPERATE SUPERVISION LOSS ALARM? [ ] YES [ ] NO	DOES EACH CIRCUIT OPERATE VALVE RELEASE? [ ] YES [ ] NO	MAXIMUM TIME TO OPERATE RELEASE MIN./SEC

TEST DESCRIPTION

HYDROSTATIC: Hydrostatic tests shall be mad at not less than 200 psi (18.6 bars) for two hours or 50 psi (3.4 bars) above static pressure in excess of 150 psi (1.07 bars) for two hours. Differential dry-pipe valve clappers shall be left open during test prevent damage. All aboveground piping leakage shall be stopped.
FLUSHING: Flow the required rate until water clear as indicated by no collection of foreign material burlap bags at outlets such as hydrants and blow-offs. Flush at flows not less than 400 GPM (1514 L/min) for 4-inch pipe, 600 GPM (2271 L/min) for 5-inch pipe, 750 GPM (2833 L/min) for 6-inch pipe, 1000 GPM (3785 L/min) for 8-inch pipe, 1500 GPM (5678 L/min) for 10-inch pipe and 200 GPM (7570 L/min) for 12-inch pipe. When supply cannot produce stipulated flow rate obtain maximum available.
PNEUMATIC: Establish 40 psi (2.7 bars) air pressure and measure drop which shall not exceed 1 % psi (0.1 bars) in 24 hours. Test pressure tanks at normal water level and air pressure and measure air pressure drop which shall not exceed 1% psi (0.1 bars) in 24 hours.

TESTS

ALL PIPING HYDROSTATICALLY TESTED AT _____ PSI FOR _____ HRS. DRY PIPING PNEUMATICALLY TESTED [ ] YES [ ] NO EQUIPMENT OPERATE PROPERLY [ ] YES [ ] NO		IF NO, STATE REASON
DRAIN TEST	READING OF GAGE LOCATED NEAR WATER SUPPLY TEST CONNECTION: _____ PSI	RESIDUAL PRESSURE WITH VALVE IN TEST CONNECTION OPEN WIDE _____PSI
Under ground mains and lead in connection to system risers flushed before connection made to sprinkler piping.: verified by copy of the U FORM NO. 85B [ ] YES [ ] NO Flushed by installer of underground sprinkler piping [ ] YES [ ] NO		Other Explain

BLANK TESTING GASKETS

Number Used	Locations	Number Removed

WELDING

Welded Piping [ ] YES [ ] NO If yes answer questions below, if no skip this section.

DO YOU CERTIFY AS THE SPRINKLER CONTRACTOR THAT WELDING PROCEDURES COMPLY WITH THE REQUIREMENTS OF AT LEAST AWS D10.9, LEVEL AR-3 ? [ ] YES [ ] NO

DO YOU CERTIFY THAT THE WELDING WAS PERFORMED BY WELDERS QUALIFIED IN COMPLIANCE WITH THE REQUIREMENTS OF AT LEAS AWS D10.9, LEVEL AR-3 ? [ ] YES [ ] NO
DO YOU CERTIFY THAT WELDING WAS CARRIED OUT IN COMPLIANCE WITH A DOCUMENTED QUALITY CONTROL PROCEDURE TO INSURE THAT ALL DISCS ARE RETRIEVED, THAT OPENING IN PIPING ARE SMOOTH, THAT SLAG AND OTHER WELDING RESIDUE ARE REMOVED, AND THAT INTERNAL DIAMETERS OF PIPING ARE NOT PENETRATED?
[ ] YES [ ] NO

CUTOUTS (DISCS)

DO YOU CERTIFY THAT YOU HAVE A CONTROL FEATURE TO ENSURE THAT ALL CUTOUTS (DISCS) ARE RETRIEVED?
[ ] YES [ ] NO

HYDRAULIC DATA NAMEPLATE

NAME PLATE PROVIDED? [ ] YES [ ] NO	IF NO, EXPLAIN

REMARKS

DATE LEFT IN SERVICE WITH ALL CONTROL VALVES OPEN:

SIGNATURES

NAME OF SPRINKLER CONTRACTOR:

TEST WITNESSED BY

FOR PROPERTY OWNER (SIGNED)	TITLE	DATE
FOR SPRINKLER CONTRACTOR (SIGNED)	TITLE	DATE

ADDITIONAL EXPLANATION AND NOTE:

SECTION 3 WATER SUPPLY

3-1 General Provisions

3-1.1 Every automatic sprinkler system shall have at least one automatic water supply.

3-2 Water Supply Sources

3-2.1 The following water supply sources are acceptable:

3-2.1.1 A connection to a reliable water-works system.

3-2.1.2 An elevated tank.

3-2.1.3 A pressure tank installed in accordance with NFPA #13, Standard for the Installation of Sprinkler Systems, and NFPA #22, Standard for Water Tanks for Private Fire Protection.

3-2.1.4 A stored water source with an automatically operated pump on a dedicated circuit of proper size and capacity, Pumps shall not cycle on and off during minimum flow situations, i.e., one sprinkler flowing.

3-2.2 All stored water sources shall have an automatic filling mechanism set to regulate the available water supply volume from a minimum low water level equal to 110% of the calculated volume to a minimum high water level of 125% of the calculated volume, or, an audible water level alarm set to give a steady signal when the water level falls below 125% of the calculated volume. Tanks shall be covered and protected against freezing. When stored water is used as the sole source of supply, the minimum calculated volume shall equal the water required to flow 3 sprinklers for 10 minutes (see 5-1,3)

3-3 Combined Piping System

3-3.1 A piping system serving both sprinkler and domestic needs shall be acceptable when:

3-3.1.1 A demand flow of 5 gal/min is included for domestic use. The domestic use shall be added to the sprinkler system in determining the size of common piping and the size of the total water supply requirement. In multiple occupancies, 2.5 GPM for each living unit up to a maximum of 50 GPM shall be added to the calculated system demand.

3-3-1.2 All piping in the system conforms to the piping specifications of this standard.

3-3.1.3 Permitted by the local plumbing or health authority.

3-4 Water Utility

3-4.1 Every Life-Safety Sprinkler System supplied by a water utility shall be provided with the following:

3-4.1.1 A State Department of Human Services approved and local utility accepted backflow prevention device arranged to prevent non-potable water from entering the domestic water supply of the distribution system. Connection for fire protection to city mains is often subject to local regulation concerning metering and backflow prevention requirements. The flow characteristics of the meter and/or backflow prevention device must be included in the hydraulic calculation of the system.

3-4.1.2 An approved pressure reducing valve in those locations where water utility pressure exceeds 120 p.s.i.

3-4.2

3-4.2.1 A service line to support a Life-Safety Sprinkler System shall be installed to the utilities specifications.

3-4.2.2 The local water utility shall comply with the local fire department requirements concerning notification of the disruption of water service to properties protected by Life Safety Sprinkler Systems, The local water utility and local fire department will be notified by the State Fire Marshal's Office of any Life Safety Sprinkler System installed within their jurisdictions

SECTION 4 SYSTEM COMPONENTS

4-1 Valves and Drains

4-1.1 Each system shall have a control valve. Control valve shall be an indicating type, locked, electrically monitored or sealed in the open position.

4-1.2 Each sprinkler system shall have a 1/2" or larger drain and test connection with valve on the system side of the control valve and flow alarm device. The test orifice size shall be equal to the sprinklers installed. Drain shall discharge to the atmosphere or to a suitable interior sanitary drain with air gap, as required by local/state plumbing codes.

4-1.3 A pressure gage shall be installed on the system side of the check valve or backflow prevention device, in an accessible and visible-location.

4-2 Pipe and fittings

4-2.1 Pipe or tube used in sprinkler systems shall be as permitted by NFPA #13. The use of Chlorinated Poly Vinyl Chloride and Polybutylene tube capable of withstanding a working pressure of 175 p.s.i. shall be permitted provided that all such tubes are completely shielded from the occupied space by a minimum thickness of 1/2" gypsum board or equivalent fire-resistive materials as determined by the Fire Marshal.

4-2.2 CPVC listed for exposed systems may be installed with the following restrictions:

4-2.2.1 Listed residential sprinklers shall be used in conjunction with exposed CPVC pipe and fittings.

4-2.2.2 Exposed CPVC piping shall only be installed under flat ceiling construction.

4-2.2.3 Deflectors of sprinklers in systems with exposed CPVC pipe and fittings shall be located in accordance with Section 5-1.5 or special listing limitations, but never more than eight inches below the ceiling.

4-2.3 Whenever- the word pipe is used in this standard, it shall be understood to also mean tube.

4-2.4 Fittings used in sprinkler system shall be as permitted by NFPA #13.

4-2.5 Joints for the connection of copper tube may be soldered when used for wet pipe systems. Solder used shall conform to local plumbing codes.

4-2.6 Fittings for CPVC or Polybutylene tubing shall be compatible with, and capable of withstanding the same working pressure as the tubing being joined.

4-3 Piping Support

4-3.1 Piping shall be supported from structural members. This standard contemplates hanging methods comparable to those used in local plumbing codes.

4-3.2 Piping laid on open joists or rafters shall be secured to prevent lateral movement.

4-4 Sprinklers

4-4.1 Only residential/commercial quick response sprinkler heads tested and listed by a recognized testing agency shall be used.

4-4.2 The sprinklers shall have fusing temperatures not less than 35 degrees F above maximum expected ambient temperature.

4-4.3 Fused, damaged or painted sprinklers shall be replaced with sprinklers having the same performance characteristics as original equipment.

4-5 Alarms

4-5.1 Local water flow alarms shall be provided on all sprinkler systems. (See section 1-5 for definition of water flow alarm.)

4-6 Spare Sprinklers

4-6.1 At least 3 spare sprinklers of each type, temperature rating and orifice size used in the system should be kept on the premises. When fused sprinklers are replaced by the owner, Fire Department, or others, care should be taken to assure that the replacement sprinkler has the same operating characteristics.

4-7 Fire Department Connection

4-7.1 Each system shall include either a single or siamese 2 1/2" Fire Department Connection with threads acceptable to local fire officials. Such connection shall be installed in accordance with NFPA #13 and readily visible and accessible. The pipe connecting to the sprinkler system shall be the same size as the system main riser and control valve.

4-8 Electrical Wiring

4-8.1 All electrical wiring for pump motors, magnetic contactors, switches, circuit breakers, alarms, etc. shall be in accordance with all applicable Local, State and National codes. Pump motor bases shall be at least 6" above the floor. Starting loads and operating loads of pump motors must be considered in determining sizing of electrical feeds, breakers and starting devices.

4-9 Electrical Supervision/Pump, Motor

4-9.1 The pump power circuit shall be monitored.

4-9.2 Methods of monitoring the pump power circuit condition include, but are not limited to, the following:

4-9.2.1 Installation of a power alarm relay connected to the pump power circuit and to a separately controlled power circuit, in such a manner as to activate an audio/visual alarm in the event of interruption of the pump power circuit, which will be promptly noticed.

4-9.2.2 Interconnection of a frequently used light or appliance with the pump power circuit, so that interruption of the pump power circuit will be promptly noticed.

4-9.3 NOTE: In all cases the pump power failure alarm should be wired so that an alarm indicator must remain "ON" until the pump power is restored. A silencing switch which deactivates an audible alarm, but simultaneously activates a visual indicating light until the pump power is restored, is one means of accomplishing this objective.

SECTION 5 SYSTEM DESIGN

5-1 Design Criteria

5-1.1 Design Discharge. The system shall provide a discharge of not less than 13 gal/min per sprinkler to three operating sprinklers in the design area.

5-1.2 Number of Design Sprinklers. The number of design sprinklers shall be 3. If a compartment contains more than 3 sprinklers, only 3 must be calculated and those sprinklers must be adjacent to one another.

5-1.2.1 The design area shall be that compartment or section of the building which is most hydraulically remote from the water supply.

5-1.2.2 The definition of compartment for use in determining the number and location of design sprinklers, is a space which is completely enclosed by walls and a ceiling. The compartment enclosure may have openings to an adjoining space if the openings have a minimum lintel depth of 8" below the ceiling.

5-1.3 Water Demand. The water demand for the system shall be determined through hydraulic calculation of the 3 most hydraulically demanding adjacent sprinklers, in accordance with section 5-1,2.

5-1.4 Sprinkler Coverage, Residential sprinklers shall be spaced so that the maximum area protected by a single sprinkler does not exceed 144 sq. ft.

5-l.4.1 Maximum distance between sprinklers shall not exceed 12 ft. on or between pipe lines and the maximum distance to a wall or partition shall not exceed 6 ft. The minimum distance between sprinklers within a compartment shall be 8 ft.

5-1.4.2 The minimum operating pressure of any sprinkler shall be in accordance with the listing information of the sprinkler and provide the minimum flow rates specified in 5-1.1. Application rates, design areas, areas of coverage, and minimum design pressures other than those specified may be used with special sprinklers which have been listed for such specific installation conditions.

5-1.5 Position of Sprinkler. Sprinklers shall be positioned so that deflectors are within 4 in. of a ceiling.

Exception: Special residential sprinklers shall be installed in accordance with listing limitations.

5-1.5.1 Sprinklers shall be positioned so that the discharge is not obstructed by beams, light fixtures or other obstructions. When tests are performed which show that sprinklers are positioned so that the discharge is not obstructed, sprinklers may be installed in accordance with the test results.

5-2 System Types

5-2.1 Wet-Pipe Systems. A sprinkler system which is filled with water at all times and protected against freezing.

5-2.2 Dry Systems. Not allowed on Life Safety systems.

5-3 Pipe Sizing

5-3.1 Piping shall be sized hydraulically in accordance with the methods described in NFPA #13.

5-3.2 The minimum pipe size shall be 3/4" on all systems using copper, CPVC and polybutylene and shall be 1" for steel.

5-4 Piping Configurations

5-4.1 Piping configurations may be looped, gridded, straight run or combinations thereof.

5-5 Location of Sprinklers

5-5.1 Sprinklers shall be installed in all areas.

Exception No. 1: Sprinklers may be omitted from all closets where the least dimension does not exceed 3 ft. and the area does not exceed 24 sq. ft. and the walls and ceilings are surfaced with non-combustible materials.

Exception No. 2: Sprinklers may be omitted from open attached porches.

Exception No. 3: Sprinklers may be omitted from carports, garages and similar structures.

Exception No, 4: Sprinklers may be omitted from attics and accessible crawl spaces which are not used or intended for living purposes or storage.

Exception No, 5: Sprinklers may be omitted from entrance foyers which are not the only means of egress.

Exception No. 6: Sprinklers may be omitted from walk-in refrigerators, freezers, coolers and similar unheated areas.

5-6 Drawings and Calculations

5-6.1 Scaled and dimensioned drawings showing building and system layout, pipe sizing, ceiling heights and similar construction features shall be signed and submitted along with hydraulic calculations and manufacturers data on sprinklers and plastic piping products to the State Fire Marshal for review and approval

prior to installation. Pump performance data and manufacturers' data shall be included in submittal.

5-6.2 Drawings and calculations shall be signed by a person holding at least a Level III certification with the National layout of sprinkler systems, or equivalent competency as evidenced by a nationally recognized organization. Certification or registration numbers of the science shall be included with each submittal. Submittals shall bear the wording:

> Reviewed and Submitted By Date of Review N.I.C.E.T. Certification Number Other Certification Type and Applicable Registration.

5-6.3 Proof of certification or registration shall be submitted to, and kept on file at, the State Fire Marshal's Office, Expiration dates shall be clearly indicated on submitted documents. Drawings and calculations signed by a person whose submitted qualification has expired will be rejected without review.

SECTION 6 MAINTENANCE

6-1 The responsibility for properly maintaining a sprinkler system is the obligation of the owner, who should understand the sprinkler system operation. A minimum monthly maintenance program should include the following:

6-1.1 Visually inspect all sprinklers to ensure against obstruction of spray.

6-1.2 Inspect all valves to assure that they are open.

6-1.3 Test all water flow devices.

6-1.4 The alarm system installed shall be tested.

NOTE: When it appears likely the test will result in the response of the Fire Department, notification to the Fire Department shall be made prior to test.

6-1.5 Pumps, where employed, should be operated weekly. (See NFPA #20, Standard for Installation of Centrifugal Fire Pumps). Pumps shall be operated by causing a pressure drop by opening the Test Connection or a system drain valve fully for a minimum pump running time of two minutes.

6-1.6 The pressure of air used with pressurized water tanks shall be checked.

6-1.7 Water level in tanks shall be checked.

6-1.8 Care shall be taken to see that sprinklers are not painted either at the time of installation or during subsequent redecoration. When painting sprinkler piping or painting in areas next to sprinklers, the sprinklers may be protected by covering with a bag which shall be removed immediately after painting has been finished.

6-1.9 For further information see NFPA #13A, Recommended Practice for the Care and Maintenance of Sprinkler Systems.

6-1.10 All sprinkler systems shall be tested at least once a year by means of the Test Connection. Certification as required by NFPA #13A shall be filed with the State Fire Marshal.

6-1.11 The property owner shall notify the local fire department anytime that the sprinkler system as been temporarily or permanently turned off.

SECTION 7 REFERENCED PUBLICATIONS

7-1 The following documents or portions thereof are referenced within this document and shall be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of issuance of this document.

7-1.1 NFPA Publications, The following publications are available from the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269.

NFPA 13 - 1987 - Standard for the Installation of Sprinkler systems

NFPA 13A - 1987 - Recommended Practice for the Inspection, Testing and Maintenance of Sprinkler Systems

NFPA 20 - 1987 - Standard for the Installation of Centrifugal Fire Pumps

NFPA 22 - 1987 - Standard for Water Tanks for Private Fire Protection

NFPA 101 - 1984 - Life Safety Code

HYDRO-PRO

A Wet or Dry Sprinkler System Designed for use in the State of Maine

Stephen B. Dodge, Editor

1993 Edition with 1998 Reference Notes

Rule for the Design & Installation of Hydro-Pro Sprinkler Systems

Preface

The intent of this design guide is to define an alternative sprinkler system installation, which offers an enhanced level of life-safety to occupants evacuating a structure during the first minutes of a detected fire. The system design is not primarily intended to adequately protect the structure itself from fire loss or damage. A complete sprinkler system designed and installed in accordance with NFPA #13 may offer superior protection to the structure and contents.

Notice: An asterisk (*) following the number or letter designating a subdivision indicates explanatory material on that subdivision (if so included). Information on referenced publications can be found in Chapter 7.

Footnotes such as this and other inserted text in [brackets] are not part of the legal adoption of the sprinkler standard, but are inserted in this edition to assist the reader in clarifying how this standard is typically applied by State of Maine authorities who regulate the fire sprinkler industry.

Questions about this standard may be addressed to 207-624-8736, or fax 207-624-8767, or e-mail “eric.j.ellis@maine.gov”, or in writing to:

Department of Public Safety
Licensing & Inspection
P.O. Box 488
Gardiner, ME 04345-0488

Further copies may be obtained by sending $5.00 for each copy along with written request to this above address. Please make check out to “Treasurer, State of Maine”. Copies are also available free from the internet at http://www.maine.gov/dps/fmo/sprinkho.htm.

July 29, 1998

Eric J. Ellis, Public Safety Inspector

Table of Contents

Chapter 1 General Information

1-1 Application.

1-1.1* The wet sprinkler system herein described is an alternative design *subject to permission for its use by the Office of State Fire Marshal* [Commissioner] *exclusively*. The system will *ordinarily* be permitted in buildings up to [and including] four stories in height [above grade], which will fall into the following categories:

-existing apartment buildings, [& new under special circumstances]

-existing hotels-motels, [& new under special circumstances]

-low-rise office buildings, [both new & existing]

-rural school systems, [both new & existing]

-existing assemblies less than 4,500 square feet, [and/or under an occupant load of 300, and in rare instances for small, new assemblies]

-existing mercantiles less than 3.000 square feet, [& new under special circumstances].

The lack of a water supply of sufficient capacity to support the normally installed N.F.P.A. #13 sprinkler system *may* be the determining factor in obtaining permission to use this alternative design. Any waivers shall be by special permission of the State Fire Marshal [Commissioner]. The burden of proof shall be on the requesting party.

*[Other considerations besides a lack of available town water are:

Is the building legally required to have sprinklers?

Is the building use licensed by the Department of Human Services? If so, then what is the exact license title?

What is the occupant load & occupant type?

What is the size of the building?

What is the construction type of the building?

Are there attached buildings and/or structures?

Is this a mixed occupancy? If town water supply is available, then is it a hardship to get the proper size line into the building? (i.e., is it on the other side of a busy, paved street, or at a great distance, or require blasting, or is seasonal timing in getting water an issue?)

Is the building new or existing?

Even if town water is readily available, the Hydro-Pro is considered as a substitute for NFPA 13 or NFPA 13R if a pump would be required, because the pump set-up for NFPA 13 and NFPA 13R may be an unreasonable hardship compared to that of Hydro-Pro when evaluating the overall project. In any case, permission to use this standard must first be granted by the State Authority Having Jurisdiction.]

1-1.2 The dry sprinkler system herein described is also an alternate design to the wet application mentioned. See category listings in 1-1.1. In residential applications, wet systems shall be given priority. *Dry systems will be allowed under special exception only, such as unoccupied areas.*

1-2 Scope.

1-2.1 This standard deals with the alternative design and installation of automatic sprinkler systems. *It is a requirement to obtain permission for the use of the sprinkler systems described herein directly from the State Fire Marshal's Office* [Commissioner] prior to preparation of plans and hydraulic calculations. Permission must also be obtained from all local authorities having jurisdiction.

1-3 Levels of protection.

1-3.1 Various levels of fire safety are available to dwelling occupants to provide life safety and property protection. This standard recommends, but does not require, sprinklering of all areas in a dwelling; it permits sprinklers to be omitted in certain areas. Such an approach produces a reasonable degree of fire safety. Greater protection to both life and property may be achieved by sprinklering all areas.

1-3.2 This standard assumes that one or more smoke detectors will be installed in accordance with the appropriate standard for the installation, maintenance and use of fire warning equipment.

1-4 Definitions.

Approved. Acceptable to the "authority having jurisdiction".

Authority Having Jurisdiction. The State Fire Marshal [Commissioner] shall be the authority having jurisdiction.

Backflow Prevention Device. A device that does not allow liquid to flow back to the supply and thus cause contamination.

[Commissioner. "Commissioner" means the Commissioner of Public Safety.]

Control Valve. A valve employed to control (shut off or turn on) a supply of water to a sprinkler system. This valve must be of an indicating type.

Check Valve. A valve that allows flow in one direction only.

Dry System. A system employing automatic sprinklers attached to a piping system c*ontaining air or nitrogen* under pressure, the release of which (as from the opening of a sprinkler) permits the water pressure to open a valve known as a dry-pipe valve. The water then flows into the piping system and out the opened sprinklers.

Fire Department Connection. A threaded inlet connection located on the exterior of a building, arranged to enable the Fire Department to pressurize and supply the sprinkler system, bypassing the system control valves and supply main.

Labeled. Equipment or material which has attached a label, symbol, or other identifying mark of an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

Listed. Equipment or materials included in a list published by an organization acceptable to the "authority having jurisdiction", such as UL or FM [which are nationally recognized independent testing laboratories], and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or material and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

Pre-engineered System. A packaged sprinkler system, including all components, designed to be installed according to pretested limitations.

Pump. A mechanical device that transfers and/or raises the pressure or flow of a fluid (water).

Residential Sprinkler Head. An automatic sprinkler specifically listed for use in residential occupancies.

Shall. Indicates a mandatory requirement.

Should. Indicates a recommendation or that which is advised but not required.

Sprinkler-Automatic. A fire suppression device which operates automatically when its heat activated element is heated to or above its thermal rating, allowing water to discharge over a specified area.

Sprinkler System. An integrated system of piping connected to a water supply, with listed sprinklers which automatically initiate water discharge over a fire area. *This Design Guide requires sprinkler systems to include a control valve and a device for activating an alarm upon system operation.*

Supply Pressure. Pressure within the water supply system (i.e. city or private water source.)

System Pressure. Pressure within the sprinkler system (i.e. above the check valve or other Backflow prevention device.)

Water Flow Alarm. An electrical sounding device activated by a water flow detector arranged to sound an alarm audible in all living areas over background noise levels with all intervening doors closed.

Wet System. A system employing automatic sprinklers attached to a piping system filled with water and connected to a water supply so that water discharges immediately from sprinklers opened by fire.

Chapter 2 Installation

2-1 Devices and materials.

2-1.1 Only listed new *residential* or commercial *quick response* head sprinklers shall be used in the installation of wet pipe life safety systems. [see 4.4.1]

2-1.1.1 Only listed commercial *quick response* sprinklers shall be used in the installation of dry pipe life safety systems. [see 4.4.1]

Exception 1: Standard sprinklers or fast-response sprinklers of intermediate or high temperature rating may be installed in areas of high ambient temperature.

Exception 2: Commercial *dry pendant* sprinklers shall be installed in areas subject to freezing.

2-1.1.2 *Return Bends* shall be used when pendant sprinklers are used on a dry pipe system (pipe and fitting shall be located in a heated area).

2-1.2 Only listed or approved sprinklers, materials, and devices shall be used in sprinkler systems.

2-1.2.1. Only U.L. *listed fire pump jockey controller panel* shall be installed.

Exception: Listing may be waived for tanks, hangers, water control valves and centrifugal pumps. All electrical components must be U.L. listed [to meet the NFPA 70 National Electric Code]. Waivers provided by the AHJ only.

2-1.2.2. Connections to water sources shall be as per NFPA #20. [1996 edition]

2-1.3 Pre-engineered systems shall be installed within the limitations which have been established by the testing laboratories where listed.

2-2 Submittals and permits.

2-2.1 All new applications employing six (6) or more sprinklers and all rework applications employing twenty (20) or more sprinklers shall be submitted to the State Fire Marshal’s Office [Commissioner] for approval.

2-2.2 Permits must be obtained for applications described in 2-2.1. Permits are subject to a fee schedule.

2-2.3 All submittals must be reviewed, and *permits obtained prior to any installation.*

2-3 Acceptance Tests.

2-3.1 The installer shall perform all required acceptance tests, complete the Contractor's Material and Test Certificate(s), and forward the certificate(s) to the local fire authority and the State Fire Marshal. [A copy of the permit must also be sent to the State Fire Marshal's Office, signed & dated by the Responsible Managing Supervisor to verify that the system has been installed as it was designed and permitted. Also see 6-1.10.]

2-3.1.1 When the "authority having jurisdiction" desires to be present during the conducting of acceptance tests, the installer shall give advance notification of the time and date the testing will be performed.

2-3.1.2 All systems must be labeled with a *hydraulic calculations name plate* upon completion of the sprinkler application.

2-3.1.3 All above ground piping shall be hydrostatically tested at *200 p.s.i. for two (2) hours*, in accordance with NFPA #13. [1996 edition]

2-3.1.4 During cold winter months, all dry systems may *as an* [temporary] *alternative* [for testing] be pneumatically tested at *40 p.s.i.* operating air pressure. Any drop in air pressure greater than 2 p.s.i. over a 24 hour period shall be repaired and retested. When the temperature becomes above freezing, system shall be tested in accordance with 2-3.1.3.

2-3.1.5 Pumps shall be tested as per NFPA #20 [1996 edition] annually.

2-3.2 *Underground mains and lead-in connections to system risers shall be flushed* at the hydraulically calculated water demand rate of the system, in order to remove foreign materials that may have entered the underground piping during the course of installation. For all systems, the flushing operation shall be continued until water is clear.

2-3.2.1 To avoid property damage, provision shall be made for the disposal of water issuing from the test outlets.

2-3.2.2 Underground mains should be tested for leakage at 50 p.s.i. above maximum working pressure.

Chapter 3 Water Supply

3-1 General provisions.

3-1.1 Every automatic sprinkler system shall have at least one automatic water supply.

3-2 Water supply sources.

3-2.1 The following water supply sources are acceptable:

3-2.1.1 A connection to a reliable *water-works system*. [town water supply]

3-2.1.2 An *elevated tank*.

3-2.1.3 A *pressure tank* installed in accordance with NFPA #13 [1996 edition] and NFPA #22. [1971 edition]

3-2.1.4 A stored water source with an automatically operated *pump* on a dedicated circuit of proper size and capacity. Pumps shall not cycle on and off during minimum flows situations, as in one sprinkler flowing.

3-2.2 All stored water sources, other than pressure tanks, shall have an *automatic filling* mechanism set to regulate the available water supply volume from a minimum low water level equal to *110%* of the calculated volume to a minimum high water level of *125%* of the calculated volume, or, an *audible water level alarm* set to give a steady signal when the water level falls below *110%* of the calculated volume. Tanks shall have covers and be protected against freezing. When stored water is used as the sole source of supply, the minimum calculated volume shall be equal to the hydraulic demand *plus 10%.* Stored supply shall be calculated for a minimum *30 minute* period.

3-2.3 Systems using submersible pumps to provide method and height of mounting. Calculated volume information to be provided.

3-3 Combined piping system.

3-3.1 A piping system serving both sprinkler and domestic needs shall be acceptable when:

3-3.1.1 A demand flow of *5 gal/min* is included for domestic use. The domestic use shall be added to the sprinkler system in determining the size of common piping and the size of the total water supply requirement. In multiple occupancies, *2.5 gpm for each living unit up to a maximum of 50 gpm* shall be added to the calculated system demand. [A solenoid switch that shuts off domestic supply upon sprinkler activation is also acceptable. Activation of the solenoid switch would be from a switch that would be activated by the flow of water, such as a flow switch or pressure switch.]

3-3.1.2 All piping in the system conforms to the piping specifications of this standard.

3-3.1.3 Permitted by the local plumbing or health authority.

3-3.1.4 Charts for NFPA13-R are used, up to a maximum of *50 gpm* in other than residential occupancies.

3-4 Water utility.

3-4.1 Every Hydro-Pro Sprinkler System supplied by a water utility shall be provided with the following:

3-4.1.1 A State Department of Human Services approved and local utility accepted *backflow prevention device* arranged to prevent non-potable water from entering the domestic water supply of the distribution system. Connection for fire protection to city mains is often subject to local regulation concerning metering and backflow prevention requirements. The flow characteristics of the meter and/or backflow prevention device must be included in the hydraulic calculation of the system.

3-4.1.2 A *service line* to support a Life-Safety Sprinkler System shall be installed to the *utilities specifications*.

3-4.1.3 The local water utility shall comply with the local fire department requirements concerning *notification of the disruption of water service* to properties protected by Hydro-Pro Sprinkler Systems. The local water utility and local fire department will be notified by the State Fire Marshal's Office [Commissioner] when any Hydro-Pro Sprinkler System is installed within their jurisdiction.

Chapter 4 System Components

4-1 Valves and drains.

4-1.1 Each system shall have a control valve. The *control valve* shall be an indicating type, *locked, electrically monitored or sealed* in the open position.

4-1.2 Each wet pipe system shall have a *half inch or larger drain and test connection* with approved flow alarm device.

4-1.3 Each dry pipe system shall have an approved dry pipe valve with trim installed per manufacturer's specifications.

4-1.4 A *3.5" diameter pressure gauge* shall be installed on the system side of the check valve, dry valve or backflow prevention device, in an accessible and visible location.

4-1.5 All *test connections* shall have an *orifice size* equal to the sprinkler heads installed. Test connections for dry pipe systems shall be in most remote area.

4-1.6 All drains shall be discharged to the atmosphere or to a suitable interior sanitary drain with air gap, as required by local or state plumbing codes.

4-1.7 All low points on dry pipe systems shall have a minimum of a *half inch drain valve*. All low points on dry pipe systems containing five or more gallons shall have an approved *auxiliary drain* as in NFPA #13. [1996 edition]

4-1.8 Air supply requirements shall be in accordance with NFPA #13. [1996 edition]

4-2 Pipe and fittings.

4-2.1 Whenever the word pipe is used in this standard, it shall be understood to also mean tube.

4-2.1.1 *(Not in use)*

4-2.1.2 Pipe or tube used in sprinkler systems shall be as permitted by NFPA #13 [1996 edition]. The use of *Chlorinated Poly Vinyl Chloride* and *Polybutylene* tube capable of withstanding a working pressure of 175 p.s.i. shall be permitted provided that all such tubes are installed in accordance with their UL Listing. [...or a listing by a nationally recognized, independent testing laboratory.]

4-2.1.3 In dry pipe systems employing black steel pipe a C-100 shall be used in calculating friction loss.

4-2.1.4 Non-metallic pipe shall not be used in dry-pipe systems.

4-2.2 *CPVC* listed for exposed systems may be installed with the following restrictions:

4-2.2.1 Listed *residential sprinklers* shall be used in conjunction with exposed *CPVC* pipe and fittings.

4-2.2.2 Exposed *CPVC* piping shall only be installed under flat ceiling construction.

4-2.2.3 Deflectors of sprinklers in systems with exposed *CPVC* pipe and fittings shall be located in accordance with Section 5-1.2 or special listing limitations, but never more than eight inches below the ceiling.

4-2.3 Fittings used in sprinkler systems shall be as permitted by NFPA #13. [1996 edition]

4-2.4 Joints for the connection of *copper tube* may be soldered when used for wet pipe systems. Solder used shall conform to local plumbing codes [and NFPA 13].

4-2.5 Fittings for *CPVC* or *Polybutylene* tubing shall be compatible with, and capable of withstanding the same working pressure as the tubing being joined.

4-3 Piping support.

4-3.1 Piping shall be supported from structural members. This standard reflects hanging methods comparable to those used in local plumbing codes, and NFPA #13. [1996 edition]

4-3.2 Piping laid on open joists or rafters shall be secured to prevent lateral movement.

4-4 Sprinklers.

4-4.1 Only approved *residential/commercial quick response* sprinkler heads tested and listed by a [nationally] recognized, [independent] testing agency shall be used. [see 2-1.1 and 2-1.1.1], [Heads listed as “Residential” are only to be used within their listing specifications, with the exception in this standard of classrooms as stated in the exception to 5-1.5. Therefore, apart from this exception, if there is no overnight occupancy, then quick response heads must be used in place of residential heads, with 2 exceptions, as listed in 2-1.1.1.]

4-4.2 The sprinklers shall have fusing temperatures not less than 35 degrees F above maximum expected ambient temperature.

4-4.3 Fused, damaged, or painted sprinklers shall be replaced with sprinklers having the same performance characteristics as original equipment.

4-5 Alarms.

4-5.1 *Local water flow alarms* shall be provided on all sprinkler systems. (See section 1-5 for the definition of water flow alarm). The alarm shall be in a supervised location.

4-6 Spare sprinklers.

4-6.1 At least *3 spare sprinklers of each type*, temperature rating and orifice size used in the system should be kept on the premises. When fused sprinklers are replaced by the owner, Fire Department or others, care should be taken to assure that the replacement sprinkler(s) is/are identical to that being replaced.

4-7 Fire department connection.

4-7.1 Each system shall include either a single or siamese *2 1/2" fire department connection* with threads acceptable to local fire officials. Such connection shall be installed in accordance with NFPA #13 [1996 edition] and be readily visible and accessible.

4-8 Electrical wiring.

4-8.1 All electrical wiring for the pump motor, magnetic contactors, switches, circuit breakers, alarms, etc., shall be in accordance with all applicable local, state and National codes. Pump motor base shall be at least *6" above the floor*.[The intent is that the lowest part of the motor shall be at least 6" above the floor.] Starting loads and operating loads of pump motors must be considered in determining sizing of electrical feeds, breakers, and starting devices.

4-9 Electrical supervision/Pump motor.

4-9.1 The pump power circuit shall be *monitored*.

4-9.2 Methods of monitoring the pump power circuit condition include, but are not limited to the following:

4-9.2.1 Installation of a power alarm relay connected to the pump power circuit and to a separately controlled power circuit, in such a manner as to activate an *audio/visual alarm in the event of interruption of the pump power circuit*, which will be promptly noticed.

4-9.2.2 *Interconnection of a frequently used light or appliance* with the pump power circuit, so that interruption of the pump power circuit will be promptly noticed.

4-9.3 In all cases the pump power failure alarm should be wired so that *an alarm indicator must remain "ON" until the pump power is restored*. A silencing switch which deactivates an audible alarm but simultaneously activates a visual indicating light until the pump power is restored, is one means of accomplishing this objective.

4-9.4 Each system shall have a *hydro-pneumatic tank with a bladder* to allow for sprinkler operation in case of power failure. Such tanks shall be rated at a minimum of *100 gallons* equivalency. [The bladder tank is to be hooked up on the system side of the check valve and main control valve but prior to the alarm device.]

Exception 1: A hydro-pneumatic tank is not required if system includes an auxiliary power generator. [or gravity tank, or town water, or pressure tank for the water supply.]

Chapter 5 System Design

5-1 Design criteria

5-1.1 *Design discharge.* The system shall provide a discharge of *not less than* 12 gal/min per sprinkler. [See 5-1.4.2 about heads with listing specifications less than this, and see 5-1.4.3 about heads requiring more than this.]

5-1.2 *Number of design sprinklers.* The number of design sprinklers shall be 4 for wet pipe systems and 5 for dry pipe systems [even if the largest compartment contains less than this]. If a compartment contains more than the number of design sprinklers, only that amount must be calculated and those sprinklers must be adjacent to one another. [This applies whether the occupancy or occupancy area is light hazard or ordinary hazard 1 or 2. For areas that are *not light hazard,* do spacing according to NFPA 13, 1996 edition, and use a density of .15 gpm/sq. ft. for ordinary hazard 1, and .2 gpm/sq. ft. for ordinary hazard 2, or density listing of the head used for that hazard and coverage area. Regardless of the hazard type, hose demand is not required in the calculations. Hydro-Pro is never considered for Extra Hazard areas.]

5-1.2.1 The design area shall be that compartment or section of the building which is most hydraulically remote from the water supply.

5-1.2.2 The definition of *"compartment"* for use in determining the number and location of design sprinklers, is a space which is completely enclosed by walls and a ceiling. The compartment enclosure may have openings to an adjoining space if the openings have a minimum lintel depth of 8" below the ceiling.

5-1.3 *Water demand.* The water demand for the system shall be determined through hydraulic calculations, in accordance with section 5-1.2.

5-1.3.1 The maximum time for water to reach a test valve in the remote area of a dry-pipe system will be *60 seconds*.

5-1.3.1.1 On dry-pipe systems with a system capacity exceeding the maximum test time, check valves may be used to segregate areas to reduce system capacity.

5-1.3.1.2 Each segregated area must have its own test valve and meet the maximum test time allowed.

5-1.3.1.3 Accelerators or multiple risers may be used to accomplish required trip test time.

5-1.4 *Sprinkler coverage.* Sprinklers shall be spaced so that the maximum area protected by a single sprinkler does not exceed manufacturers specifications.

5-1.4.1 *Maximum distance between sprinklers* shall not exceed manufacturer's specifications. The maximum distance to a wall or partition shall not exceed one half of maximum allowable distance between sprinklers. The *minimum distance between sprinklers* within a compartment shall be *8 feet* [unless the listing for the particular head(s) used varies from this]. The minimum allowable distance to a wall or partition is *4 inches.*

5-1.4.2 The minimum operating pressure of any sprinkler shall be in accordance with the listing information of the sprinkler and provide the minimum flow rate specified in 5-1.1. *Application rates, design areas, areas of coverage, and minimum design pressures other than those specified may be used with special sprinklers which have been listed for such specific installation conditions.*

5-1.4.3 When *commercial quick response* heads are used, areas of coverage [for each head], application rates, densities and minimum design pressure should be as per NFPA #13 [1996 edition] for the hazard protected. [Regardless, only the 4 or 5 head calc is required according to 5-1.1 & 5 1.2. Kitchens outside of dwelling units are considered to be ordinary hazard 1. Vacant areas such as basements are considered to be ordinary hazard 1 or 2 depending upon potential of storage height.]

5-1.5 *Position* of sprinkler. Sprinklers shall be positioned so that deflectors are *within 4 inches of a ceiling.*

Exception: Special *residential sprinklers* shall be installed in accordance with listing limitations. [See 4-4.1 and 2-1.1 and 2-1.1.1.]

Exception: Residential heads shall be allowed in school classrooms.

5-1.5.1 Sprinklers shall be positioned so that the discharge is not obstructed by beams, light fixtures, or other *obstructions*. When tests are performed which show that sprinklers are positioned so that the discharge is not obstructed, sprinklers may be installed in accordance with the test results.

5-2 System types.

5-2.1 *Dry-pipe systems.* A sprinkler system *containing pressurized air or nitrogen,* the release of which (as from the opening of a sprinkler) permits the water pressure to open a valve known as a dry-pipe valve. The water then flows into the piping system and out the opened sprinklers. This system may be used in areas subject to freezing.

5-3 Pipe sizing.

5-3.1 Piping shall be sized hydraulically in accordance with the methods described in NFPA 13. [1996 edition]

5-3.2 The *minimum pipe size* shall be 3/4" on all systems using *copper, CPVC,* and *polybutylene* and shall be 1" for steel

5-4 Piping configurations.

5-4.1 Piping configurations may be looped, gridded, straight run or combinations thereof.

5-4.1.1 Gridded pipe systems shall not be accepted on dry-pipe systems per NFPA #13. [1996]

5-5 Location of sprinklers.

5-5.1 Sprinklers shall be installed in all areas, including walk-in *refrigerators, freezers and coolers.*

Exception #1: Sprinklers may be omitted from all *residential closets* where the least dimension does not exceed *3 feet* and the area does not exceed *24 square feet* and the walls and ceiling are surfaced with non-combustible materials. [...or limited combustible materials.]

Exception #2: Sprinklers may be omitted from open attached *porches* in residential occupancies or with the approval of "authority having jurisdiction".

Exception #3: Sprinklers may be omitted from *carports, garages,* and similar structures if approved by the "authority having jurisdiction".

Exception #4: Sprinklers may be omitted from *attics* and accessible *crawl spaces* which are not used or intended for living purposes or storage.

Exception #5: Sprinklers may be omitted from *unheated entrance foyers* which are not the only means of egress [that has sprinkler protection].

Exception #6: Sprinklers may be omitted from *bathrooms* which are *55 square feet* or less in area.

Exception #7: Special situations with the prior approval of the AHJ.

5-6 Drawings and calculations.

5-6.1 Scaled (1/8" or 1/4" = 1 foot) [or some similar type scale] and dimensioned drawings showing building and system layout, pipe sizing, ceiling heights and similar construction features shall be signed and submitted along with hydraulic calculations and manufacturer's data on sprinklers and plastic piping products to the State Fire Marshal [Commissioner] for review and approval prior to

installation. Pump performance data and manufacturer's data shall also be included in the submittal.

5-6.2 Drawings and calculation shall be signed by a person holding at least a Level III certification with the National Institute for Certification of Engineering Technologies in layout of sprinkler systems, a Professional Engineer (P.E.) or a licensed Responsible Managing Supervisor (R.M.S.) Certification or registration numbers of the science shall be included with each submittal. Submittals shall include the following:

Reviewed and Submitted By:

Date of Review:

N.I.C.E.T. Certification Number:

Other Certification Type Number:

Contractors Licensing Number:

5-6.3 Proof of certification or registration shall be submitted to and kept on file at the State Fire Marshal's Office [Commissioner]. Expiration dates shall be clearly indicated on submitted documents. Drawings and calculations signed by a person whose qualification as submitted has expired will be rejected without review.

Chapter 6 Maintenance

6-1 The responsibility for properly maintaining a sprinkler system is the obligation of the owner, who should understand the sprinkler system operation. A minimum monthly maintenance program should include the following:

6-1.1 Visually inspect all sprinklers to ensure against *obstruction* of spray.

6-1.2 Inspect all *valves* to assure that they are open.

6-1-3 Test all *water flow devices.*

6-1.4 The *alarm system* installed shall be tested.

6-1.5 *Pumps.* where employed, should be *operated weekly* in accordance with NFPA #20 [1996 edition]. Pumps shall be operated by causing a pressure drop by opening the Test Connection or a system drain valve fully for a *minimum pump running time of two minutes.*

6-1.6 The *pressure of air* used with pressurized water tanks shall be checked.

6-1.7 The *water level* in tanks shall be checked.

6-1.8 Care shall be taken to see that sprinklers are not painted either at the time of installation or during subsequent redecoration. When *painting* sprinkler piping or painting in areas next to sprinklers, the sprinklers may be protected by covering with a bag which shall be removed immediately after painting has been finished.

6-1.9 For further information, see NFPA #25. [1995 edition]

6-1.10 All sprinkler systems shall be *tested at least once a year* by means of the Test Connection. Certification as required by NFPA #25 [1995 edition] shall be filed with the State Fire Marshal [Commissioner]. [See 2-3.1]

6-1.11 The property owner shall *notify the local fire department and their insurance company* anytime that the sprinkler system has been temporarily or permanently turned off.

Chapter 7 Referenced Publications

7-1 The following documents or portions thereof are referenced within this document and shall be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of issuance of this document.

7-1.1 NFPA Publications. The following publications are available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269, [800-344-3555]

NFPA 13 (1991) - Standard for the Installation of Sprinkler Systems, [Now 1996]

NFPA 20 (1990) - Standard for the Installation of Centrifugal Fire Pumps, [Now 1996]

NFPA 22 (1987) - Standard for Water Tanks for Private Fire Protection, [Actually the current adopted edition is 1971]

NFPA 101 (1988) - Life Safety Code, [Now 1994]

NFPA 13R (1991) - Standard for the Installation of Sprinkler Systems in Residential Occupancies up to Four Stories in Height, [Now 1996]

NFPA 25 (1992) - Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems, [Now 1995]

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